

**DOMESTIC MESSAGE / DATA NETWORKS:
USER CHARACTERISTICS AND
VALUE ADDED REQUIREMENTS**

INPUT

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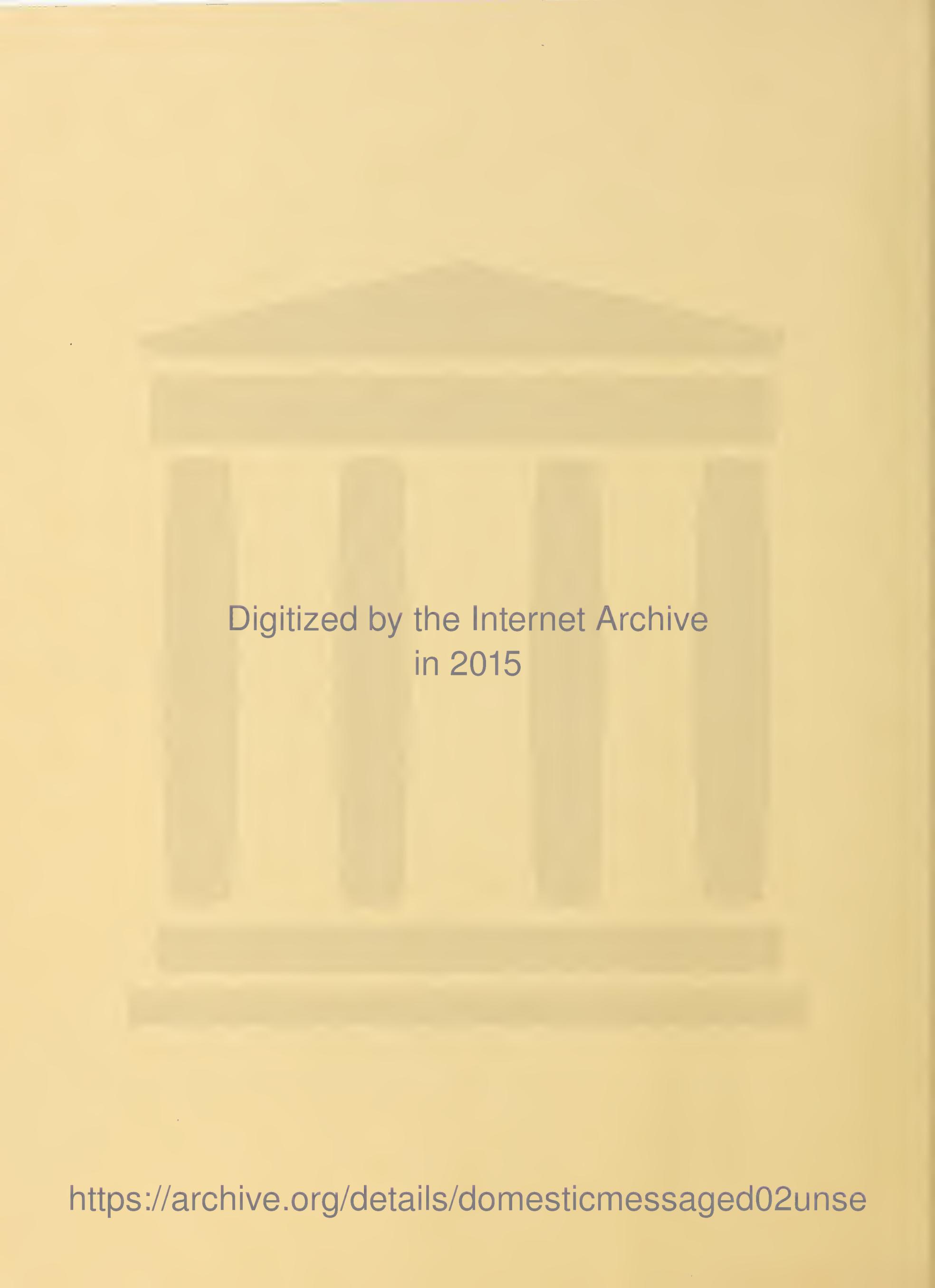
**DOMESTIC MESSAGE/DATA NETWORKS:
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I INTRODUCTION



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I INTRODUCTION

A. PURPOSE, SCOPE, AND OBJECTIVES

- This study was done for ITT World Com and summary conclusions were presented on October 19, 1981.
- The overall purpose of the study was to examine some of the domestic communication needs of large U.S. companies.
- The study scope included gathering information on corporation networks such as:
 - TWX/Telex.
 - High-speed message.
 - Data communication.
 - Facsimile.
 - Word processing.
 - Intrapremise.

- In addition, the scope included examination of corporate usage of such services as:
 - Cablegram.
 - Mailgram.
 - Telegram.
 - Remote computing services.
- The stated objectives of this study were to:
 - Determine the current status and future needs of protocol conversions, and explore the level of interest in having a value added carrier provide such a service.
 - Determine the domestic need for, potential traffic volume, and price levels of a list of value added features that the client is currently providing internationally.
- An implied objective was to recommend other communication services that are needed by large U.S. companies.
 - These additional services could provide alternative ways of entering the U.S. market.

B. METHODOLOGY

- The research for this study was accomplished by on-site, in-depth interviews with 50 large companies or divisions of large companies.

- The companies interviewed are listed alphabetically in Appendix A.
- The companies interviewed were not chosen randomly and many of them participated in a previous INPUT study for the same client.
- The previous study dealt primarily with the TWX/Telex network usage.
- The interviews were spread around the country, as shown in Exhibit I-1.
 - The northeast area ranged from Hartford, Connecticut, to central New Jersey.
 - The west coast interviews took place in San Francisco, Palo Alto, and greater Los Angeles, California.
 - The south central interviews took place in Dallas.
 - The north central interviews were in the greater Chicago area.

C. DEMOGRAPHICS

- In some companies it was necessary to interview more than one person.
 - The levels of responsibility and the functional areas of the respondents are shown in Exhibit I-2.
 - The "others" group refers to specialists in telecommunications, lead TWX operators, and other similar nonmanagerial job functions.
 - The office services/systems group frequently encompassed all networks except data communications.

EXHIBIT I-1

GEOGRAPHIC DISTRIBUTION OF RESPONDENTS

AREA	PERCENT OF RESPONDENTS
NORTHEAST	48%
WEST COAST	22
SOUTH CENTRAL	16
NORTH CENTRAL	14

EXHIBIT I-2

RESPONDENTS' RESPONSIBILITIES

TITLE	NUMBER OF RESPONDENTS
Vice Presidents	7
Directors	12
Managers	31
Others	8

FUNCTIONAL AREA	NUMBER OF RESPONDENTS
Communications	33
Data Processing	15
Office Services/Systems	10

- . In these cases an additional interview was attempted with the data processing department.
- . Conversely, the data processing department usually did not have much information on the TWX/Telex network, and the information had to be obtained from others.
- It is generally useful to have some background on the respondents to the study; Exhibits I-3 through I-6 provide general corporate information.
 - This information refers to the corporation rather than to a specific division in those cases where a division was interviewed, as indicated in Appendix A.

D. DEFINITIONS

- It is important at the beginning to understand the various terms used in the study in the same way that the terms were explained to the respondents.
 - Network - a group of terminals (at least two) capable of being connected to each other such that information can pass from one to the other.
 - TWX/Telex Networks - The public switched record/message networks operated by Western Union. The TWX network is a low-speed (110 baud) record/message network using ASCII code. The Telex network is a low-speed (50 baud) record/message network using Baudot code.
 - . A private TWX/Telex network uses the public switched network, but the traffic is limited to terminals within the private network.

EXHIBIT I-3

RESPONDENT DISTRIBUTION
BY INDUSTRY

INDUSTRY	PERCENT OF RESPONDENTS
Manufacturing	50%
Finance and Insurance	28
Transportation and Utilities	12
Miscellaneous	10

N = 50

EXHIBIT I-4

RESPONDENT DISTRIBUTION
BY SALES

SALES	PERCENT OF RESPONDENTS
\$5 Billion and Over	18%
\$1 Billion - \$5 Billion	40
\$500 Million - \$1 Billion	18
Under \$500 Million	24

N = 50

EXHIBIT I-5

RESPONDENT DISTRIBUTION
BY NUMBER OF LOCATIONS

NUMBER OF LOCATIONS	PERCENT OF RESPONDENTS
1,000 and Over	10%
500 to 1,000	8
100 to 500	24
Under 100	58

N = 50

EXHIBIT I-6

RESPONDENT DISTRIBUTION
BY NUMBER OF EMPLOYEES

NUMBER OF EMPLOYEES	PERCENT OF RESPONDENTS
100,000 and Over	4%
50,000 to 100,000	12
10,000 to 50,000	44
10,000 and Less	40

- . The limitation is not physical and the public directory does not list these terminals.
- Private Message Network - A group of terminals usually connected by leased lines handling intracompany message traffic primarily; off-net traffic is minimal.
- Data Communications Network - A group of terminals that primarily send information to and receive information from a computer.
- Intrapremise Network - A very local (within a building) group of terminals capable of being interconnected such as Ethernet and Wangnet.
 - . A characteristic of this type of network is the diversity of terminal types that can be interconnected.

II EXECUTIVE SUMMARY



II EXECUTIVE SUMMARY

A. KEY CONCLUSIONS

- The value added network features included in this study were of value and interest to most of the companies.
 - Twenty-four percent were not using and had no interest in the features under study.
 - Thirty-four percent were using at least half of the listed features.
- Few respondents were interested in specific features. In general, these features, along with the network management reports, were thought of as being available as a group using a software application package on their own host or using the services of a carrier.
 - The important point is that they were considered as an entity and not as separate items.
 - . Therefore, few respondents could place a dollar value on the individual items.
 - Slightly more than half (26) of the respondents came up with price information.

- . Fourteen of these respondents wanted an all-inclusive fee for all the features whether or not they were used.
- . Those that quoted a varying price for the package felt that 10% to 15% of the communications cost would be a reasonable price.
- . Others quoted prices such as:
 - \$50 per month per terminal.
 - \$10,000 per year.
- . In general, the data processing oriented respondents felt a single annual license fee should be charged regardless of the traffic volume since the software is another application package.
- Large companies of the type interviewed are concerned about their increasing communication costs. The future seems to indicate still additional traffic and networks so these companies are attempting to increase the efficiency of their current resources and are planning to take advantage of new technology to better utilize their future networks.
 - The merging of intracompany message networks and data networks is a priority action item for many companies during the 1980s.
 - Intracompany TWX/Telex usage will decline. Twenty-two percent of the respondents expect such traffic to decline substantially or not exist within five years.
 - The use of IBM's Customer Information Control System (CICS) software package makes the IBM 3270 network available as a message network in addition to a data network.

- . The use of IBM 3270 type terminals will spread beyond the data network, so it will become an extensive message network.
- Message traffic beyond the confines of the company will be directed vertically within an industry to the company's suppliers and distributors.
 - This external message traffic will increasingly be directed toward very intelligent terminals and small business systems as the suppliers and distributors take advantage of today's low-cost systems.
- Communicating word processors (CWP) will play a large role in message networks in the next five years.
 - As office automation increases its presence in large companies during the 1980s, the word processor will be its ubiquitous symbol.
 - The proliferation of so many intelligent devices throughout a company makes it an easy decision to allow them to communicate with each other.
 - . The actual implementation of the decision will be more difficult than the making of the decision itself, especially if the word processors are from different manufacturers.
 - New intracompany message networks are using CWP as a starting element.
 - . These are always built by the same manufacturer for compatibility.
 - Those companies that have an extensive IBM 3270 type of network will tend to expand this network rather than begin with new equipment.

- . However, many CWP's can work within an IBM 3270 network and hybrid networks will grow.
- Those companies that had communications protocol conversion requirements were generally satisfied, as shown in Exhibit II-1.
 - Thirty-eight percent of the responses were negative, however, and these companies would appreciate assistance.
 - The companies doing the conversion in software only were the most dissatisfied, feeling that it took up too much computer time or too many resources to accomplish a trivial task.
- The large companies interviewed felt that since there has been little progress made toward the adoption of communication standards, they will either have to adopt standards within their own companies or accept the fact that protocol conversion will be needed for quite awhile.
 - Large companies frequently let their divisions and subsidiaries operate independently so it will be difficult to force them to accept a single manufacturer's equipment under the guise of standardization.
 - Twenty-three respondents (46%) expect their network interfacing requirements to increase because they expect the relative cost of sending messages electronically to decrease (in relation to U.S. mail, etc.) and because more workers will have access to a message originating device.
 - Exhibit II-2 shows in broad terms the networks the respondents felt would be required during the next five years.
 - Ten percent of the responding companies expect to unify all their internal message and data traffic under the SNA/SDLC umbrella so that protocol conversion will be minimized or unnecessary.

EXHIBIT II-1

APPROACHES TO PROTOCOL CONVERSION

CONVERSION METHOD	PERCENT DISSATISFIED	PERCENT DISSATISFIED
Hardware Only	17%	0
Hardware and Software	14	10%
Software Only	21	21
Carrier	10	7
All Methods	62	38

N = 29

EXHIBIT II-2

PROTOCOL CONVERSIONS REQUIRED BY RESPONDENTS DURING THE NEXT FIVE YEARS

SNA and X.25

SNA and Office Equipment

SNA and Tymnet

SNA and Personal Computers

Satellites and Local Networks

Telex and Fax

B. RECOMMENDATIONS

- Offer network value added features and network management reports as a total package of services.
 - Price the services as a total package.
 - Market the package to the lower half of the Fortune 500 and to all of the Fortune second 500.
 - The very large companies have their own communications networks with many value added features built into their applications packages which run on either the host system or the communication's front end processor.
 - . Some of these large companies have problems interfacing their networks and they are looking for a carrier that can provide a "universal information transportation system."
 - . Even though these companies like to consider themselves self-sufficient, the expense of building such a system is so great that they would be willing to share the facilities.
- Create a facilities management group to provide a variety of services to companies starting to build a network.
 - Many medium sized companies (\$100-\$200 million in sales) are in the startup mode for data communications and are confused. They would welcome the assistance of an experienced service supplier to:
 - . Design the network.
 - . Select the equipment.

- Provide value added services.
 - Operate and manage their network.
- These companies would also be willing to share switching facilities with others because of the possible cost reductions with a broader base of customers.
- Provide value added network services for specific industries.
- The larger travel agencies are supplied with terminals from United Airlines and American Airlines. Both of these carriers find it uneconomical to supply the smaller agencies (those that cannot support at least six terminals) with reservation terminals.
- In addition, there are at least six other major airlines that would like to provide all travel agents with computerized access to their reservation banks.
- The independent insurance agents that place insurance in several companies would like access to their customers' records, etc., on the insurance company's computer.
 - The larger independents have terminals supplied by the insurance company but most of the agencies are too small to receive terminals.
- Many of these small agencies are large enough to have a small data processing system purchased from one of the turnkey system suppliers.
- The insurance industry carrier does not provide the protocol conversions necessary to enable every agent's system to communicate with theirs; this being different from other users.

- Industries that utilize routemen have a daily need to obtain orders quickly in as close to machine usable form as possible so that delays will be minimized.
 - . A service facilitating this information flow is salable.
- Newspapers would like to be able to communicate local news directly to the local cable systems for use in the local area.
 - . There are about 70 towns in Bergen County, New Jersey, and conceivably there could be 70 cable TV networks.
 - . There is only one major Bergen County newspaper.
 - . The newspaper would like to sell news and send it directly to each cable network.
- Provide value added services that would allow and encourage word processors with communications such as:
 - Message services including domestic and international TWX/Telex.
 - Other word processors within the company and in other companies.
 - Company data processing systems in other cities.
- Consider the possibility of creating a "non-stop" data network and sell it as such.
 - Many of the large companies have commented that data networks, while sounding very reliable (99.5% up-time) are not nearly as reliable as the AT&T voice network.

- Business today depends very heavily upon their data communications networks.
- Selling reliability can be very lucrative in the communications field, as Tandem found it to be in the data processing arena.

C. KEY SUMMARY STATISTICS

- Twenty-four percent of the responding companies had five communications networks in place, as shown in Exhibit II-3.
- Forty-two percent of the respondents relied upon their TWX/Telex network as their primary message network.
- Although 39 companies had a facsimile network in place, no clear picture of growth emerged.
 - . Some companies are planning to replace their TWX/Telex network with an expanded facsimile network while others were not happy with their facsimile equipment and/or services and were letting the network languish.
- A number of companies that were using some of the value added features under study, used them only in a limited way because the features were part of an intelligent terminal complex that did not extend throughout the corporation.
 - The use of selected features is shown in Exhibit II-4, which includes some double counting due to the respondents who are currently using certain value added features but would like to extend the services to the rest of the company.

EXHIBIT II-3

RESPONDENTS' NETWORK CONFIGURATIONS

NETWORK	PERCENT OF RESPONDENTS
TWX/Telex	82%
High-Speed Message	64
Data Communications	96
Facsimile	78
Word Processing	54
All	24

N = 50

EXHIBIT II-4

SUMMARY OF KEY VALUE ADDED
FEATURE USAGE

FEATURE	PERCENT CURRENTLY USING	PERCENT WOULD LIKE TO HAVE
Departmental Billing	42%	22%
Automatic Retry	36	30
Abbreviated Calling	42	22
Sequential Call Placement	24	12
Automatic Service Upgrade	22	10

- This extension is planned as the addition of more intelligent terminals rather than the use of a value added service supplier.
 - No negative comments were received concerning the use of such a service supplier, however, and the companies might use such a supplier if the costs can be shown to be less than current ones and the level of service high.
- Total message traffic for any of these companies was difficult to determine because only seven company respondents knew the average daily traffic on both the TWX/Telex network and on the other message networks.
 - One respondent whose two other message networks carried over five million characters each day felt that obtaining traffic figures for the public and private TWX/Telex networks was "like pulling teeth."
- The top five users of the TWX/Telex networks were not among the top five or bottom five users of other message networks.
 - Similarly, the bottom five users of the TWX/Telex networks were not among the top or bottom five users of other message networks with one exception in which one respondent was in the bottom group of users of both types of networks.
- There seems to be a reasonably high (54%) need for domestic message switching capability, as shown in Exhibit II-5.
 - While 18% are currently using message switching, 4% use it exclusively for their own private use.
 - Cost is the usual reason given for accepting a shared capability.
 - The 24% who indicated a need for a private switch cited control, self-sufficiency, and security as the reasons for not sharing.

EXHIBIT II-5

RESPONDENTS' MESSAGE SWITCH REQUIREMENTS

	PERCENT		
	PRIVATE SWITCH	SHARED SWITCH	PRIVATE OR SHARED - COST DETERMINED
Have Current Need	24%	22%	8%
Have Switch Now	4	14	0
No Need for Switch	2	2	0

N = 50

- The few that said the switch could be either private or shared generally preferred private but recognized that the high cost would probably push them into using a shared service.
 - . A shared switch is more easily justified.
- Some respondents who have no need for a switch expressed an opinion as to whether they would like it shared or private.
- While descriptions of expected growth were not explicitly quantified in this study, the respondents anticipate tremendous growth during the early 1980s especially in the high-speed message network area. Comments that were not uncommon were:
 - "We'll grow from 50 terminals to 800."
 - "Expect 100% growth in the next five years."
 - "Network will double in size by 1985."
- Growth in data communications, while not as great as in message networks, will be sizable.
- Overall, 84% of the companies felt that growth in the communications area would be significant during the next five years.

III SURVEY ANALYSIS

III SURVEY ANALYSIS

A. INTRODUCTION

- This study concentrated on how TWX/Telex, other message, and data communication networks are used by large companies.
 - Particular emphasis was placed on the correct use of a set of network management services, value added features, and protocol conversions.
 - Future use of these services was also emphasized.
- However separate and distinct these networks and services appear to be, they are frequently intertwined so that separating some facts from others for interview purposes became very difficult at times.
- This analysis will follow the questionnaire form to describe important inter-relationships where necessary.

B. VALUE ADDED NETWORK SERVICES

- Even though the general attitude was package oriented and many respondents showed little interest in specific features, they were willing to comment on them, as shown in Exhibit III-1.
- Many of the services provided by the listed features were accomplished through the use of intelligent terminals or via a shared host processor belonging to the company.
 - Twenty-six percent of the responding companies used some intelligent terminals in their TWX/Telex message networks.
 - . These respondents tended to favor increased use of such terminals and so they predicated their willingness to pay for value added features on the cost of intelligent terminals.
- Few respondents used or expressed a desire for additional value added services; the two that are currently used are:
 - Message delivery to DDD numbers.
 - Automatic refile of overseas traffic into the domestic network.
- One respondent desired an easy entry to a gateway such as to Tymnet and Telenet.
- The pricing area was difficult for many respondents due to their lack of familiarity with payment for features based upon usage.
 - Domestic approaches to providing similar sets of value added features use the following:

EXHIBIT III-1

RESPONDENTS' PREFERENCES FOR
SPECIFIC VALUE ADDED NETWORK FEATURES

FEATURES	CURRENTLY USING (PERCENT)	WOULD LIKE TO HAVE (PERCENT)
Departmental Billing	42%	22%
Fractionalized Billing	16	6
T&C Call Billing	22	4
Abbreviated Calling	36	30
Automatic Retry	42	22
Sequential Call Placement	24	12
Group Codes	38	18
Multiple Addressing	46	18
Message Formatting	38	12
Answerback Verification	44	10
Automatic Service Upgrade	22	10
Mailbox Delivery	24	12
Station Polling	18	18

N = 50

- . Applications software on the host intelligent terminals with the feature frequently in the cluster controller.
 - . Software combined with hardware in a communication's front end processor.
- The users of such facilities pay one price that includes all or most of the value added features of interest in this study.
- . The prices paid by these users or desired by prospective users are shown in Exhibit III-2.
- Some of the respondents did give an indication of the perceived value of individual features. Their responses are shown in Exhibit III-3 and include the feature is of "low priority," or the cost should be "less than a clerk."
- The monetary responses were generally prefaced by some limiting remark such as "I don't know," or "maybe" or "Is 10¢ O.K.?"
- Two of the four network management features that received the highest response in the "would like to have" column shown in Exhibit III-4 were answered more enthusiastically than the others.
- Traffic reports and least cost routing are positive aspects of network management.
 - . Least cost routing when done effectively can tangibly increase network productivity.
- Timely traffic reports help the communication manager manage his resources most effectively.

EXHIBIT III-2

VALUE ADDED PACKAGE PRICES QUOTED BY RESPONDENTS

5-10% for Premium
10-12% Premium
Single Charge for All
15% Premium
\$10,000/Year for All
Package Price
Flat Fee for All
\$400-\$500 Extra Purchase Price per
Intelligent Terminal
5% for All
10% Extra for the Package

EXHIBIT III-3
RESPONDENTS' WILLINGNESS TO PAY
FOR SPECIFIC VALUE ADDED NETWORK FEATURES

VALUE ADDED FEATURES	RESPONSES
Departmental Billing	Nominal, Less than a Clerk, \$1.00 per Month Term, 10% Premium, Small Amount
Fractionalized Billing	Low Priority
T&C Call Billing	Nominal
Abbreviated Calling	\$2.00 per Month Term, Very Little, Less than \$100, 10¢ per Message, 10% Premium, Free from W.U., \$25 per Month
Automatic Retry	\$25 per Month, 10¢ per Message, 10% Premium, Siemens Software, Programmed T1000, Prompter
Sequential Call Placing	—
Group Codes	5% Premium
Multiple Addressing	Nominal, 10% Premium, Prompter
Message Formatting	\$50 per Month Term
Automatic Answerback Verification	Siemens Software, Prompter
Automatic Service Upgrade	10% Premium
Mailbox Delivery	10¢ per Message
Station Polling	10¢ per Message, 15% Premium, \$50 per Month, 10% Premium

EXHIBIT III-4

NETWORK MANAGEMENT FEATURES RESPONDENTS ARE USING
OR WOULD LIKE TO HAVE

FEATURES	CURRENTLY USING (PERCENT)	WOULD LIKE TO HAVE (PERCENT)
Message Delivery Status - Inquiry Based	52%	12%
Message Delivery Status - Next Morning Report	42	8
Message Retrieval - On-line	50	10
Message Retrieval - Off-line	34	4
Archival Message Storage	34	8
Traffic Reports	48	26
Station Status Reports	40	22
Station Authorization Controls	30	18
Operator Intercept	24	14
Least Cost Routing	22	18

N = 50

- For 34% of the respondents, at least some of the network management features are provided by communications application programs on the host processor.
- The premium price that the respondents were willing to pay for network management varied considerably, as shown in Exhibit III-5.
 - The provider of network management services is expected to provide the following in addition to assuming full responsibility for the network:
 - A guaranteed up-time of 99.9% using alternate routing.
 - An absolute response time monitor.
 - Billing by site usage.
- Respondents were more willing to pay for traffic reports as an individual service than any other individual service.
 - Respondents felt that traffic reports were worth:
 - \$5/day.
 - Less than 5%.
 - \$10,000/year.
 - \$1,000/month to individual respondents.
- Other services rarely had individual price tags attached because the respondents had difficulty thinking of them as separately useful services; some examples of price tags were:
 - Next morning report on message states - \$5/report.

EXHIBIT III-5

PREMIUMS RESPONDENTS WERE WILLING TO PAY
FOR NETWORK MANAGEMENT SERVICES

2% or about \$300,000/year
35-40 cents/transaction
\$100,000/year
\$100/month/station (currently 44 stations)
\$250,000/year
10-15%/year
5-10% or about \$25,000-\$50,000/year

- On-line message retrieval - 10¢/message.
- Station status reports and station authorization controls - \$100,000/year.
- Operator intercept - less than a person.
- Least cost routing - \$50/month (automatic "good line selector").
- The IBM 5520 administrative distribution system was considered a reasonable unit for providing many network management services.

C. TWX/TELEX NETWORK ANALYSIS

- The largest TWX/Telex network among the respondents included 650 terminals. Three additional networks included over 250 terminals. The spread for the 41 companies that use the public network is shown in Exhibit III-6.
- Six responding companies have a private TWX/Telex network in addition to their public network.
 - . The addresses of these terminals are not listed in the public directory.
- Five respondents used the TWX/Telex network for communication with other companies exclusively.
- Two companies reported that 100% of their traffic was internal.
- The average amount of internal message traffic reported was 65%.

EXHIBIT III-6

NUMBER OF TERMINALS PER TWX/TELEX NETWORK

NUMBER OF TERMINALS	PERCENT OF COMPANIES
No Answer	5%
1-10	34
11-39	29
40 and Over	32

N = 41

- The majority (21 companies) of the 35 companies that responded to the traffic question reported that 80-100% of their traffic was internal.
- Two companies reported that 90% of their messages were multiple address messages.
 - Both of these companies claimed that administrative messages were the primary application for the TWX/Telex network, and both were in the 90-100% group for intracompany traffic.
 - For most respondents (19 of 28) multiple address traffic was under 5% of the total.
 - . Eight of the nineteen claimed no multiple address traffic.
- Only 16 companies responded to the traffic expense question. In general, the more decentralized the company the less a single or small group of people knew about overall costs or traffic.
 - Those managers with nominal corporate communications responsibility felt frustrated by their lack of knowledge in this area.
- The average monthly traffic expense for the 16 responding companies was \$18,000. The full distribution was:
 - Over \$20,000/month - three companies.
 - \$11,000-\$20,000/month - seven companies.
 - \$10,000 and less/month - six companies.
- All three companies paying over \$20,000 were in the chemical/drug manufacturing business and most of the traffic was internal administrative messages.

- One had over 150 terminals while the other two had fewer than 40.
- Twenty-two respondents were familiar with the size of the message that was sent via the TWX/Telex network.
 - The average message ran to 850 characters and all the responses were distributed as follows:
 - . 1-499 - six companies.
 - . 500-999 - seven companies.
 - . 1,000-4,000 - nine companies.
- Twenty-eight respondents had some knowledge of the number of messages sent each day on the TWX/Telex network.
 - The average number of messages sent daily was 335 with a wide range:
 - . 1-99 - 11 companies.
 - . 100-499 - 12 companies.
 - . 500-2,500 - 5 companies.
 - The median was 110 messages per day.
- The banking industry was different.
 - Bank traffic varied considerably from 10 times the average rate (20/200) down to a 25% increase (400/500, 200/250, etc.).
 - . Only 10 respondents had any feel for peak traffic.

- The daily TWX/Telex traffic, as shown in Exhibit III-7, was computed for the 21 respondents who knew both the average message size and the average number of messages sent or received each day.
- Those respondents that projected a decline in TWX/Telex traffic either did not know one of the two elements needed to compute the traffic or were at or below the 10,000 characters per day figure in Exhibit III-7.
- Those respondents that did not know either the average message size and or the daily message traffic frequently made one of two types of comments:
 - "It's so frustrating, I'm supposed to know those things but I never can get numbers I believe in."
 - "There are more important things for me to worry about - that stuff is trivial."
- Two companies reported using a computer for billing customers on their TWX/Telex network and one of these had the highest monthly expense of all respondents.
 - Both of these respondents billed only to the using department and not to the actual user.
- Thirty percent of the 40 respondents to the cost allocation question kept TWX/Telex costs as part of the corporate overhead expense.
 - Twenty-five percent billed to the departmental level and 45% billed to the individual.
- Twenty-eight people knew the method used to allocate TWX/Telex costs.

EXHIBIT III-7

RESPONDENTS' TWX/TELEX TRAFFIC DETAILS

AVERAGE NUMBER OF CHARACTERS PER DAY	AVERAGE NUMBER OF MESSAGES PER DAY	AVERAGE DAILY TRAFFIC (Characters per Day)
1,350	2,350	3,172,500
1,000	2,000	2,000,000
1,200	750	900,000
4,000	200	800,000
1,800	200	360,000
285	600	171,000
1,000	100	100,000
1,200	70	84,000
500	125	62,500
500	120	60,000
150	350	52,500
225	200	45,000
300	100	30,000
500	20	10,000
60	100	6,000
1,000	5	5,000
120	30	3,600
500	4	2,000
500	2	1,000
20	30	600
500	1	500

AVERAGE DAILY TRAFFIC = APPROXIMATELY 375,000
CHARACTERS PER DAY.

- Forty-six percent used manual methods, while 39% billed to the terminal address which was usually situated in a branch or sales office where there was a single terminal.
- All of the nine companies using intelligent terminals plan to increase the number of intelligent terminals installed.
 - This increase will primarily be replacement of existing non-intelligent terminals.
- Eleven companies will construct their TWX/Telex network over the next five years; some of the directions they will take are:
 - Move TWX/Telex traffic to facsimile.
 - Replace TWX/Telex with high-speed message.
 - Electronic mail network will take over from TWX/Telex.
- Six companies expect no growth over the next five years and seven expect growth in the number of terminals, the network, and the traffic.
- Today's applications, shown in Exhibit III-8, will change little during the next five years except for those applications based upon "office automation" experiments or systems, such as electronic mail.

D. DATA ANALYSIS OF OTHER MESSAGE NETWORKS

- The number of terminals in the respondents' message networks ranged from 5 to 5,750, with the distribution shown in Exhibit III-9.

EXHIBIT III-8

TWX/TELEX APPLICATIONS

- Administrative Messages
- Financial Information to Corporate
- Order Confirmations
- Shipping Advisories
- Interface to Railroads
- Order/Policy Status
- Price Quotes/Delivery Information
- Vendor Messages
- Credit Information
- Shipping Orders to Warehouses

EXHIBIT III-9

NUMBER OF TERMINALS ON RESPONDENTS'
OTHER MESSAGE NETWORKS

NUMBER OF TERMINALS	PERCENT OF COMPANIES
1-100	44%
101-500	40
Over 500	16

N = 32

- These networks were frequently controlled by a large IBM mainframe and the control programs ran as application programs.
 - In addition, IBM Series I and DEC PDP-11 series occasionally acted as communications front ends.
 - Two companies used minicomputers to run the message network separately from their mainframe systems.
- While the trend is to consolidate networks and to use existing IBM 3270 networks as both high-speed message and data networks, three companies had multiple high-speed message networks.
 - Fifteen respondents were using their IBM 3270 network as a message network.
 - Nineteen companies had other, usually higher speed, message networks in place including some non-3270 networks at companies that also had 3270 networks.
- Respondents generally talked of a swing to SDLC, but only three companies were using that protocol.
 - Eight respondents, however, were using bisync protocols usually under SNA.
 - Two of these respondents have definite plans to switch to SDLC within two years.
- Line speeds ranged from 150 baud to 230,000 baud with 9,600 baud being the most commonly used speed.
 - The higher speed 230KB and 56KB lines were used for computer to computer traffic.

- Lower speed lines, especially 1,200 and 2,400 baud, are used for remote terminals while 9,600 baud is used for in-house, hard-wired terminals.
- These message networks carry a heavy preponderance of in-house traffic.
 - Seventy-five percent of the 20 responses claimed that at least 90% of their traffic on these networks stays within the company.
- While 20 respondents knew the average number of messages sent each day on these networks, only 18 knew the average length of a message.
 - The average number of messages per day was 2,815, the median was 750, and the distribution was:
 - . 1-500 - nine companies.
 - . 501-1,000 - three companies.
 - . 1,001-10,000 - seven companies.
 - . Over 10,000 - one company.
 - The average number of characters in a message was 390, the median was 300, and the distribution was:
 - . 1-250 - seven companies.
 - . 251-500 - six companies.
 - . 501-1,000 - five companies.
- The average daily traffic shown in Exhibit III-10 has some curious gaps in the distribution.

EXHIBIT III-10

OTHER MESSAGE NETWORK TRAFFIC DETAILS

AVERAGE NUMBER OF CHARACTERS PER MESSAGE	AVERAGE NUMBER OF MESSAGES PER DAY	AVERAGE DAILY TRAFFIC (Characters per Day)
400	7,500	3,000,000
150	20,000	3,000,000
1,000*	3,000*	3,000,000*
525*	5,000*	2,025,000*
300	6,850	2,055,000
1,000	2,000	2,000,000
300	4,000	1,200,000
285	4,000	1,140,000
625	500	312,000
400	500	200,000
1,000	200	200,000
200	800	160,000
200	700	140,000
100	1,000	100,000
300	20	6,000
200	10	2,000
25	50	1,250

AVERAGE DAILY TRAFFIC = 1,126,000 CHARACTERS PER DAY.

*TWO DIFFERENT AND SEPARATE NETWORKS AT ONE COMPANY.

- The top eight companies (high group) send or receive over 1,000,000 characters per day.
- The next six (the medium group) send or receive between 100,000 and 350,000 characters per day.
- The small group (three) send or receive 6,000 or less characters per day.
- The gaps - between 6,000 and 100,000 and between 312,000 and 1,140,000 - seem to have no obvious explanation.
 - The lowest three are manufacturing companies but other manufacturing companies are spread throughout the distribution.
 - There was also no correlation with sales, employees, or plant locations.
- One of the companies in the high group (2,055,000 characters per day) claims a peak traffic of 8,220,000 characters per day.
- The one respondent that had two separate high traffic message networks also had two TWX/Telex networks (one public and one private) but found that determining the traffic on these was like "pulling teeth."
- A substantial portion (9 of 29) of the respondents reported that the networks' expenses for message traffic was considered corporate overhead.
 - More than half (16 of 29) billed the costs directly to the message originator and the last 14% billed the department, leaving it up to the department to do a further breakdown of the bill if it desired.
- Only 11 respondents had any idea of the traffic expense on this network. These 11 were distributed as follows:

- \$300,000 per month and over - three.
 - \$100,000-299,000 per month - two.
 - Under \$100,000 per month - six.
- One company will phase its message network out during the next five years and another expects that the number of terminals will double during that same period.
 - The average terminal growth is expected to be about 50% per year and a major concern is how to restructure the total communications approach so that costs will grow at a lower rate.
 - Respondents would like costs not to grow at all, of course, but having them grow at the 15-20% per year level would be acceptable.
- The applications using these message networks are more industry oriented than those using the TWX/Telex networks:
 - Messages between a bank and its major customers.
 - Traffic between an airline and travel agents.
 - Boiler plate on engineering specifications to field offices.
- The more general applications include:
 - Electronic mail.
 - Administrative traffic.
 - Credit checking.

- Word processing documents.
- Those that did not have electronic mail systems planned felt that they would at least be experimenting with a system within five years.

E. DATA COMMUNICATIONS NETWORK ANALYSIS

- The average number of terminals per respondent's network is distributed as shown in Exhibit III-11.
 - Twenty-seven of the 41 respondents who answered the terminal type question were using IBM 3270 series terminals and/or a compatible series from another manufacturer.
 - Four networks were batch oriented and 10 respondents had asynchronous ASCII terminals on their network or other kinds of devices.
 - . One example of "other kinds of devices" is radio transmitters that send signals to a computer every time a person boards or leaves a bus while enroute.
 - . This not only tracks traffic patterns so that additional busses can be dispatched to crowded routes but it also keeps a rough check on the money expected from each run.
- Most users reported multiple applications running on their data communications networks. The more commonly mentioned ones are shown in Exhibit III-12.
 - In general, during the next five years these companies are planning to expand the networks to:

EXHIBIT III-11

NUMBER OF TERMINALS PER RESPONDENT'S
DATA COMMUNICATIONS NETWORKS

NUMBER OF TERMINALS	PERCENT OF COMPANIES
1-99	20%
100-499	51
500 and Over	29

N = 41

EXHIBIT III-12

APPLICATIONS OF RESPONDENTS' DATA COMMUNICATIONS NETWORK

APPLICATIONS	NUMBER OF MENTIONS
General Business	15
Data/Order Entry	14
Financial Reporting	10
Industry Specific	8
T/S and Technical	8
Inventory Management	7

- More sales offices.
- More branches.
- Most customers would rather add applications to the system.
- The growth areas apart from network expansion are:
 - Increased data base access.
 - Interface office equipment such as word processing and office distribution systems.
- Network growth will slow down during the next five years among these respondents.
 - Respondents expect their network for data communications to double or triple in size over the next five years. This means an average annual growth rate of between 15% and 25%.
 - During the previous five years many of these same respondents built the network from zero terminals to the present number.

F. FACSIMILE NETWORK ANALYSIS

- Thirty-four respondents have facsimile networks and 32 at least knew the number of terminals and/or the number of locations for terminals.

- In these statistics, if the respondent knew the number of facsimile terminal locations but was not sure of the total number of terminals, it was assumed that there was one terminal per location. This is a conservative approach, because many companies had more than one terminal in some locations.
 - The average number of terminals per network is 50, with the median at 20, and the total distribution as follows:
 - 1-19 - fifteen companies.
 - 29-99 - ten companies.
 - 100-200 - seven companies.
- One company will remove its facsimile network by 1985 and replace it with a word processing network that includes a graphic capability.
 - Another company that has 20 terminals uses the networks for emergencies only and will get rid of it by 1985.
- Facsimile network traffic is shown in Exhibit III-13 for those 15 respondents that had the information.
 - One additional respondent claimed the network "is used continuously" but could not provide the details.
- The respondent that reported the highest use of the facsimile network claimed the costs ran \$1,500 to \$2,000 per month.
 - Most of the other respondents did not know the costs because the charges appear on the sender's telephone bill and were not easily distinguished from a telephone call.

EXHIBIT III-13

FACSIMILE NETWORK TRAFFIC DETAILS

PAGES PER MESSAGE	MESSAGES PER DAY	PAGES PER DAY
1*	1,200	1,200
2	250	500
35	10	350
2	70	140
1	120	120
2	50	100
3	20	60
2	30	60
1	60	60
2	25	50
1	17	17
4	3	12
1	12	12
2	4	8
2	3	6

- AVERAGE PAGES PER DAY = 180, MEDIAN IS 60 PAGES PER DAY.
- EXCLUDING THE HIGHEST FIGURE, THE AVERAGE = 105 PAGES PER DAY.

*80% OF THE MESSAGES ARE ONE PAGE, THE OTHER 20% ARE LONG, BUT THE RESPONDENT DID KNOW WHAT THE OVERALL AVERAGE WAS.

- The costs quoted by the few others who knew were:
 - . \$1.25 per message.
 - . \$1.50 per message
 - . \$1.75 per message.
 - . \$1.80 per message.
 - . \$3.80-\$4.00 per message.
- The installed equipment included every major and some minor vendors.
 - Xerox, Rapifax, and Panafax equipment was used most frequently.
 - Burroughs, 3M, and QWIP were in the second groups.
 - Thirteen of the 34 respondents with facsimile networks used only one vendor's equipment.
 - . This may have included different models from the same vendor.
- Half of the 20 respondents who knew the speed of their facsimile equipment had settled on a single speed throughout the corporation.
 - These speeds covered the range from one-minute through six-minute systems.
- Of the 10 that had multiple speed equipment, all had six-minute equipment.
 - The second speed was usually four minutes, but, again, there was a full range starting with sub-minute equipment.

- The major applications of the facsimile network are:
 - To transmit financial reports from remote locations to corporate headquarters.
 - To send engineering drawings, maps, and engineering change orders to field locations.
 - To exchange administrative documents among company locations.
- Twenty-nine of the 34 respondents that have facsimile networks are using the public switched voice network in unadorned fashion.
 - One additional user runs the facsimile network at night using auto calling and auto answering devices.
- Most respondents showed little interest in value added features or services on the facsimile network.
 - Two respondents tried Faxpac and claimed it did not work.
 - One respondent is looking at Graphnet and Faxpac and will be using one of them by 1985.
- Of those four respondents using a value added service only one uses the full range of available features, as shown in Exhibit III-14.
 - In addition to the payments for individual features that respondents would be willing to make, one respondent would be willing to pay \$6,000/month for all of the features in a store and forward system and another would pay less than \$20/month for all of the value added features.

EXHIBIT III-14

VALUE ADDED FEATURES IN USE OR DESIRED BY RESPONDENTS
FOR FACSIMILE NETWORKS

FEATURE	NUMBER OF COMPANIES CURRENTLY USING	NUMBER OF COMPANIES WOULD LIKE TO HAVE	COMMENT
Departmental Billing	1	2	—
Abbreviated Calling	4	7	Nominal Cost
Automatic Retry	2	4	One Time Charge for Software
Sequential Call Placement	2	1	—
Group Codes	1	2	Would Pay \$0.10 per Message
Multiple Addressing	1	2	Would Pay \$0.10 per Message
Automatic Answerback Verification	1	1	—
Automatic Service Upgrade	1	3	Should use WATS at Night
Mailbox Delivery	2	1	—
Station Polling	1	2	Would Pay \$0.10 per Message

C. INTRAPREMISE NETWORK ANALYSIS

- The respondents had a difficult time with the definition of an intrapremise network despite all the articles that have been written in the trade press over the last two years.
 - Many respondents considered and, in some cases, insisted that their IBM 3270 type COAX network is an intrapremise network.
 - The differences are definitional and for this study intrapremise networks were defined in two ways:
 - . First by example, such as Ethernet or Wangnet.
 - . Second by a definitional approach - an intrapremise network has many types of terminals sharing a controlled facility such as a cable. The intrapremise network is more versatile than a 3270 network which basically has only one display (or display-printer combination) on each cable to the controller.
- Twelve percent of the respondents have an intrapremise network, usually a Wangnet.
 - Thirteen additional respondents (26%) expect to have some intrapremise networks in place by 1985.
- A measure of usefulness of the intrapremise network is the number of off-net services that can be utilized from a local terminal.
 - An underlying assumption in discussions of intrapremise networks is that access to the network is easily achieved through many terminals located throughout the premises.

- Word processing is expected to be the most needed external service interconnected to the intrapremise networks of the respondents by 1985, as shown in Exhibit III-15.
 - Packet switching is the most commonly used external service among those having intrapremise networks. It is used primarily in accessing a computer at a remote location.
- The data communication network is an intracompany network that is different from the local intrapremise networks.
 - Eleven respondents want to access their companies' data communication networks from their local premises network.
- Remote computing services refer to the use of a remote computer owned by a computer service organization not related to the respondent's company.
 - The users of a remote computing service can be subdivided into four categories and the expected use of each from an intrapremise network is:

<u>Service</u>	<u>Used Currently</u>	<u>Needed By 1985</u>
Applications	2 companies	8 companies
Data entry	0 companies	9 companies
Programming	1 company	8 companies
Data base access	1 company	9 companies

EXHIBIT III-15

INTRAPREMISE NETWORK INTERCONNECTION
TO EXTERNAL SERVICES REQUIREMENTS SUMMARY

SERVICE	PERCENT USING NOW	PERCENT NEEDING BY 1985
Word Processing	2%	28%
Electronic Mail	0	26
Data Communication Network	2	22
Domestic TWX/Telex	4	20
International Telex	6	20
Remote Computing Services	4	20
Facsimile Network	2	16
Dataphone	8	14
Packet Switching	10	14
Parcel	0	12
Mailgram	6	10
Telegram	4	10
Cablegram	4	8
Teletex	0	6

N = 50

H. OTHER COMMUNICATIONS SERVICES OR FACILITIES USAGE

I. CABLEGRAM

- Fifty percent of the respondents use the cablegram service. It is used primarily where the party cannot be reached by Telex.
 - Seven of these users stressed that their use is minimal.
 - No respondent who does not use cablegram now plans to use the service within the next five years.
- Five respondents quoted traffic figures for cablegram usage other than low or very little but their specific figures are also low:
 - 1 per day.
 - 5 per day.
 - 10 per day.
 - 15 per day.
 - 20 per day.
- Two of these were quoted on a monthly basis as 20 per month and 300 per month so it is expected that traffic may not be even throughout the month but might occur at a particular portion of a month on a regular basis.
- Access to the cablegram service is usually via the TWX or Telex networks.
 - Four users have direct lines to international carriers.

- One user has a facsimile connection to WUI.
- One user accesses the service via ITT's ARX service.
- Most users permit every terminal to send a cablegram if necessary.
 - Three companies permit access only from corporate headquarters.

2. MAILGRAM

- Twenty-seven respondents use mailgram service currently and two others plan to use it within five years.
- Any need for bulk mailing suits itself to mailgram service as does the need for hand copy where TWX/Telex is not available. Some specific uses are:
 - Price increase (decrease) to wholesalers.
 - Recruiting services.
 - Order confirmations.
 - Special promotions to 18,000 travel agents.
 - Very long messages (Infomaster is convenient).
- Traffic for the most part was considered low or very low by most of the respondents. Others quoted specific traffic as:
 - 8 to 10 per quarter.
 - 5 per day.
 - 10 per day.

- 25 per day.
- 150 per day.
- 800 per day.
- Most users access the mailgram service via their TWX/Telex networks while others access it from:
 - Telephone.
 - RCA.
 - Facsimile network.
 - AIRCON.

- In general, any terminal is an access point to send mailgrams.
 - Six users send them only from headquarters.
 - One user sends a tape directly to INFOCOM.

3. TELEGRAM

- Telegram service is used domestically by respondents in a fashion similar to the way cablegram service is used for overseas messages - where there is no other access to the receiver.
 - Primary users are:
 - Order confirmation to vendors.
 - To reach sales agents.

- . To distribute price changes to people outside of the company such as wholesalers.
- One respondent quoted costs as being \$500 to \$600 per month for telegram service.
 - No other traffic figures or costs were given.

4. U.S. POSTAL SERVICE ECOM

- The U.S. Postal Service fledgling electronic mail service is used by five respondents, and five additional respondents may use the service in the next five years.
 - Those using the service do so "sparingly."
 - Those planning to use the service feel it would be useful for:
 - . Premium billing notes (500/day).
 - . Promotional and branch mail.
 - . General mail.

5. DATAPHONE

- While Dataphone service was used by almost half (23) of the respondents, many used modems also.
 - For some, Dataphones are the backbone of their companywide time-sharing system or provide basic access to remote computing services.
 - For others, it provides a backup service to other networks.

- Traffic knowledge was sparse among the respondents and the few answers were presented differently:
 - 60 minutes per day at 4,800 baud.
 - 15 minutes per day.
 - 25,000 transactions per day.
- The number of access points was generally not known.
 - The quoted numbers ranged from one to 200 among six respondents.

6. DATEL

- Three companies use Datel service and two plan to use it, one in 1982.
 - Most respondents did not know anything about the service and it was described to them as an international Dataphone.
- One user uses Datel service for its European backup service while the other two users have a variety of applications for the service.
 - One user sends 10 messages per day via Datel and the other two report low usage.
 - Access in one company is from four terminals using public voice network and, in another company, from 10 terminals using the international DDD service.

7. PACKET SWITCHING

- Packet switching elicited the most comments from the respondents even though such services were not the most widely used.

- Twelve of the interviewed companies are using packet switching services and ten more plan to use such services by 1985.
 - At least one company decided to consider packet switching due to IBM's announced support of X.25.
 - Two users are developing a private packet switching network. One expected user is seriously considering developing a private internal packet switching network.
- The applications shown in Exhibit III-16, both current and proposed, are fairly broad. As usage increases, subscribers will find specific applications that best fit a packet transmission service.
- One respondent quoted traffic as:
 - Tymnet - high.
 - Telenet - low.
- Other user traffic was quoted as:
 - 65 million characters per month.
 - 20,000 characters per month.
 - 50 transactions per day.
- Expected future users quoted traffic volumes as:
 - 100,000 pages per day.
 - 150,000 messages per day.

EXHIBIT III-16

CURRENT AND PROPOSED
PACKET SWITCHING APPLICATIONS

CURRENT	PROPOSED
<ul style="list-style-type: none">● Traffic to Europe● Voice Network● Financial Information● Scientific Computing● Timesharing● For Low Volume Terminals	<ul style="list-style-type: none">● Access to Travel Agents● Corporate Data Network● Data Processing Communications● For Transmission Efficiency and Reliability

- Access points to packet transmission services ranged from 10 to 5,000 over six respondents:
 - Current users.
 - 5,000.
 - 100.
 - 50.
 - 10.
 - Expected users.
 - 75.
 - 10.

8. RCS - APPLICATIONS

- Twenty-four responding companies run applications programs using a remote computing service (RCS), as shown in Exhibit III-17.
 - Five additional companies have their own in-house T/S (timesharing) operations and one is moving in this direction.
 - One respondent moved T/S in-house when it found its bills were running to seven figures.
- Those companies that were adamant about keeping T/S in-house still had financial forecasting and management done at a service company.

EXHIBIT III-17

APPLICATIONS PROGRAMS USING REMOTE COMPUTING SERVICES

- Raw Materials Management
- Engineering Calculations
- Financial Planning and Management
- Modelling and Simulation
- Personnel Applications
- Trust Department Applications
- Money Notes
- Credit Checks
- Money Transfer
- Foreign Exchange

- The necessary programs are complex and the data base requires updating frequently for decisions that are crucial to the company. It is too expensive to maintain private econometric and investment data bases.
- Respondents did not know traffic volumes in this area. The few which were mentioned are:

<u>Traffic</u>	<u>Numer of Terminals</u>
400 million characters per year	500
Five hours per day	8
3,000-4,000 characters per month	2
\$2,000 per month	2

- Many companies that had extensive in-house T/S only had one terminal in the finance department to access the remote service.

9. RCS - DATA ENTRY

- Data entry is not generally done using a remote service. It is the main application for in-house 3270 networks.
 - Eight companies said they are using such service and one plans to do so.
- Two respondents have their data sent to G.E. remote computing centers for preprocessing and then it is sent to the corporate system.
 - The company planning to do remote data entry on a service center is working with AT&T to preprocess the order under Advanced Communications Service (ACS), when available.

10. RCS - PROGRAMMING

- Few companies write their programs using a service center's system. This is another primary application for in-house 3270 networks.

11. RCS - DATA BASE ACCESS

- A wide variety of data bases, shown in Exhibit III-18, is used by the 22 companies who use remote data base services.
 - The Medical Information Bureau data base was the only specific data base to be cited more than once.
- One company accesses the data bases using three word processing terminals.
 - Generally, companies limit access to these data bases to the specific departments that need the data so the number of terminals that can gain access is low, usually under five.
 - . Exceptions occur when everyone has access or when the information must be available to satisfy customer inquiries such as the use of rail car location information.

I. MESSAGE SWITCH REQUIREMENTS ANALYSIS

- While the most prevalent (30%) desire was for a message switch to handle all networks, many respondents had specific desires:
 - Data communications.
 - Electronic mail.

EXHIBIT III-18

DATA BASE TYPES ACCESSED
BY RESPONDENTS

- The Source
- Dow Jones
- Dun & Bradstreet
- Medical Information Bureau
- Rail Car Locator
- Bank Balance
- News Data Base
- Legal Data Bases
- Financial Data Bases
- Travel Data Bases
- Credit Information
- Bibliographic Data Bases

- Word processing.
- IBM 3270 network.
- Message.
- Voice.
- Microwave.
- Primarily, the companies were willing to share a message switch with other companies because it would cost them less; a secondary reason was the realization that a shared capability serving diverse requirements might provide a "universal transportation system" so that any terminal, network, or service could easily communicate with any other terminal, network, or service.

J. PROTOCOL CONVERSION/NETWORK INTERFACING

- Companies would like to be able to ignore the protocol conversion problem. To achieve this, some companies are planning to convert their message and data networks into one SDLC network.
 - It is likely, however, that a small amount of traffic will have to be sent using a noncompatible service.
- The protocol conversions listed in Exhibit III-19 do not change much as the respondents project their needs over the next five years.
 - In the next five years, the major change in the protocol conversion picture will be the increased need to convert to packet switching services.

EXHIBIT III-19

PROTOCOL CONVERSION REQUIREMENTS

<ul style="list-style-type: none">● TWX/Telex● Wang WP● BSC● 5520● ASYNCH	to SDLC 20%
<ul style="list-style-type: none">● TWX/Telex● BSC● SDLC● Wang WP● ASYNCH	to BSC 26%
<ul style="list-style-type: none">● Wang WP to TWX/Telex● Industry Networks<ul style="list-style-type: none">- Bankwire, Fedwire, Swift to SDLC- Sabre to BSC and SDLC- SITA, ARINC to SDLC and BSC● WP to WP● WP to FAX● ECOM, Mailgram to SNA	Other 54%

N = 61

- IBM announced support of X.25 will increase the requirements, but the need will increase with other packet protocols also.
 - Conversion between X.25 and the SABRE system was mentioned as an upcoming example.
- Hardware will provide a satisfactory answer for companies' needs.
 - As technical developments progress, such conversions are being built into individual devices in a switchable form so that device "X" can talk to device "Y."
 - . This is not satisfactory in a general sense because the sender must know the protocol of the device at the receiving end.
- Software built into a switch is much more flexible and can keep current as devices change.
 - A software solution, while judged not satisfactory by many current users, permits messages to be sent from one terminal using group codes in the address, for example, to a number of terminals whose protocols are unknown to the sender but well known to the switching software.

K. RESPONDING COMPANIES' COMMUNICATIONS GROWTH

- The respondents' answers varied greatly in describing the communications growth they expected to see in the next five years.
 - Teleconferencing and videoconferences were the most frequently mentioned items.
 - Other comments were:

- 30-40% AAGR.
- Communication cost will increase 70% by 1985.
- Huge growth in function and connectivity.
- 240% growth.
- System growth, but cost should stay the same at \$24 million per year.
- \$1.5 million now, will grow to \$23 million by 1985.
- Just getting started so growth will be great.

- Those respondents expressing no interest in having communicating personal computers on the premises, as shown in Exhibit III-20, seemed adamant on the issue. INPUT's experience indicates that this attitude will most likely change and by 1985 most of the respondents will have personal computers on some company network.
 - Respondents expect to be using Videotext in the 1983-1985 timeframe, with one respondent not expecting to use it until 1985-1990.
 - Those respondents who showed interest in using communicating personal systems expect to see them prevalent within their companies by 1983.
 - Communicating word processors are in fairly widespread use among the respondents. Those people who do not have them do not expect to see them until 1985, with one respondent waiting until 1988.

EXHIBIT III-20

RESPONDENTS' USE AND EXPECTED USE
OF THE LATEST TECHNOLOGY

TECHNOLOGY	USING NOW	WILL USE	NO INTEREST	NO ANSWER
	NUMBER OF RESPONDENTS			
Videotext	0	9	29	12
Communicating Personal Computers	8	14	16	12
Communicating Word Processors	23	16	4	7
X.25 Devices	3	18	15	14

- The adoption of X.25 devices is a function of the amount of European traffic a company will have over the next few years. Use of X.25 devices will increase according to the respondents but such adoption will be spread from 1982 to 1988.

L. COMMUNICATIONS INDUSTRY CHANGES

- There are three recurrent themes among the myriad of responses received concerning changes necessary to improve communications:
 - Standardization on both the national and international scenes.
 - Increased reliability of data and message networks.
 - Improved network management.
- Some of the less frequently mentioned changes are:
 - Increased bandwidth.
 - Increased DDS availability.
 - Provision of universal transportation system.
 - Voice store and forward.
 - VAN supporting SDLC.
- Overall, the respondents had a tremendous amount of specific suggestions that will have to be faced individually by any carrier attempting to provide value added services to large companies.

**APPENDIX A: ALPHABETICAL LIST OF
COMPANIES INTERVIEWED**

APPENDIX A: ALPHABETICAL LIST OF COMPANIES INTERVIEWED

- Abbott Laboratories.
- Aetna Life Insurance Company.
- American Airlines.
- American Can Corporation.
- American Express.
- Arvey Corporation.
- Avon Corporation.
- Bell and Howell.
- Bluecross of Texas.
- Chase Manhatten Bank.
- City National Bank of Los Angeles.
- Combustion Engineering.

- Continental Can Corporation.
- Continental Group.
- Continental Illinois Bank and Trust Company.
- GATX.
- Gulf and Western Corporation.
- Ingersoll-Rand Corporation - Torrington Division.
- Levi-Strauss, Inc.
- Litton Industries.
- Lone Star Industries.
- Lone Star Life Insurance Company.
- Metropolitan Life Insurance Company.
- MGM Films.
- Morgan-Stanley.
- Nestles.
- Pacific Gas and Electric Company.
- Philip Morris.
- The Record.

- Republic National Life Insurance Company.
- Rockbestos Corporation.
- St. Regis Paper Company.
- Southern California Rapid Transit District.
- Southwestern Life Insurance Company.
- Stanley Works - Stanley Tool Division.
- Syntex Corporation.
- Tosco Corporation.
- Trailways.
- Union Oil Company.
- Uniroyal Corporation.
- United Airlines.
- U.S. Borax and Chemical Company.
- U.S. Filter Corporation - Drew Chemical Division.
- Warner-Lambert, Inc.
- Wells-Fargo Bank.
- Witco Chemical Company.
- F.W. Woolworth Company.

APPENDIX B: RESPONDENT TERMINAL SUMMARY

APPENDIX B

RESPONDENT TERMINAL SUMMARY

RESPONDENT	TWX/TELEX TERMINALS	OTHER MESSAGE TERMINALS	DATA COMMUNICATION TERMINALS	FACSIMILE TERMINALS
1	30	-	40	26
2	13	400	400	200
3	60	3,000	100	-
4	5	10	-	-
5	7	-	258	9
6	-	137	20	-
7	2	100	30,300	20
8	-	-	2	2
9	-	75	144	-
10	-	-	40	-
11	30	166	400	15
12	-	-	44	-
13	-	2,000	30,000	-
14	15	-	60	28
15	10	6	7	10
16	40	4,000	4,800	2
17	-	82	550	-
18	-	130	149	-
19	1	10	192	4
20	-	150	350	7
21	18	5,750	5,750	36
22	200	100	500	100
23	60	165	200	12
24	4	265	-	4
25	12	50	150	20

APPENDIX B (Cont.)

RESPONDENT TERMINAL SUMMARY

RESPONDENT	TWX / TELEX TERMINALS	OTHER MESSAGE TERMINALS	DATA COMMUNICATION TERMINALS	FACSIMILE TERMINALS
26	250	351	438	200
27	100	-	2,700	85
28	40	-	140	8
29	40	500	-	-
30	25	250	600	20
31	11	-	120	7
32	23	6	-	-
33*	-	-	-	50
34	2	30	300	6
35	4	5	1,642	-
36	9	-	300	106
37	3	-	360	-
38	28	100	-	-
39	13	30	3,200	19
40	260	200	300	142
41	205	-	250	150
42	80	115	450	72
43	10	-	490	165
44	4	-	700	30
45	35	30	300	35
46	-	130	-	2
47	100	-	-	-
48	560	640	3,700	-
49	5	-	-	14
50	3	40	40	-

* HAS 12 DATA NETWORKS, WOULD NOT GIVE ANY QUANTITATIVE DATA. FACSIMILE TERMINALS FROM PREVIOUS STUDY - NOT USED IN COMPUTING AVERAGES, TOTALS, ETC. FOR THIS STUDY.

APPENDIX C: RELATED INPUT REPORTS

APPENDIX C: RELATED INPUT REPORTS

- Value Added Network Services. January 1978
- User Communication Networks and Needs. November 1980
- A Potential Market Study of a Domestic Record/Data Communications Service. February 1980

APPENDIX D: QUESTIONNAIRE

DOMESTIC NETWORK SERVICES
USER QUESTIONNAIRE

PART I BACKGROUND INFORMATION

1. What is the total company size:

	<u>1980</u>	<u>ANNUAL GROWTH RATE</u>
a. Sales	_____	_____
b. Number of Employees	_____	_____
c. Number of Plants	_____	_____
d. Total Number of U.S. Locations	_____	_____

2a. Please list the type of networks used in your company.

<u>TYPE</u>	<u>NUMBER</u>	<u>PUBLIC/PRIVATE</u>	<u>NUMBER BY 1985</u>
TWX/Telex	_____	_____	_____
Other Message Networks	_____	_____	_____
Data Communications	_____	_____	_____
Facsimile	_____	_____	_____
Word Processing	_____	_____	_____
Electronic Mail	_____	_____	_____
Intra-Premise	_____	_____	_____
Other	_____	_____	_____

2. May we have a copy of a system map for each of these?

3a. Which of these networks, if any, communicate with each other?

3b. In each of the cases where there is traffic between networks how is the protocol conversion accomplished. Are you satisfied with this method?

<u>NETWORK</u>	<u>TO</u>	<u>NETWORK</u>	<u>PROTOCOL</u>	<u>TO</u>	<u>PROTOCOL</u>	<u>CONVERSION METHOD</u>	<u>SATIS- FACTORY</u>
_____	TO	_____	_____	TO	_____	_____	_____
_____	TO	_____	_____	TO	_____	_____	_____
_____	TO	_____	_____	TO	_____	_____	_____

3c. Please describe your need or desire, if any, for more extensive inter-network communications.

PART II TWX/TELEX NETWORK

4. How many terminals by type are on the TWX/Telex network?

<u>TOTAL TERMINALS</u>	<u>TYPE/NO.</u>	<u>TYPE/NO.</u>	<u>TYPE/NO.</u>
_____	_____	_____	_____

5. What is the daily traffic on the TWX/Telex network?

<u>AVG. # CHARS. PER MESSAGE</u>	<u>AVG # MSGS. PER DAY</u>	<u>PEAK MSGS. PER DAY</u>	<u>% INTRA. COMPANY</u>	<u>% MULTIPLE ADDRESS</u>
_____	_____	_____	_____	_____

6a. What is the average monthly traffic expense of the TWX/Telex network?

6b. Are the costs allocated to the individual users?

6c. What methods are used to allocate the charges?

7. How has the system grown over the last five years and how do you expect it to grow during the next five years?

GROWTH IN PERCENT				
<u>PERIOD</u>	<u>NUMBER OF TERMINALS</u>	<u>NUMBER OF MESSAGES</u>	<u>COST</u>	<u>PERCENT INTER COMPANY</u>
Last five years	_____	_____	_____	_____
Next five years	_____	_____	_____	_____

8a. What are the primary applications on the TWX/Telex network today?

1. _____
2. _____
3. _____

8b. What applications will you be adding or deleting during the next five years?

9. Please fill in the following chart with respect to the listed user oriented/value added network features.

FEATURES	CURRENTLY USING	AVAILABLE BUT NOT USING (WHY)	WOULD LIKE TO HAVE	(PAYING OR WILLING TO PAY)	USEFUL WITH RESPECT TO COST	HAVE YOU DROPPED ANY FEATURES (WHY)
Departmental Billing						
Fractionalized Billing						
T&C Call Billing						
Abbreviated Calling						
Automatic Retry						
Sequential Call Placement						
Group Codes						
Multiple Addressing						
Message Formatting						
Answerback Verification						
Automatic Service Upgrade						
Mailbox Delivery						
Station Polling						
Other						

PART III OTHER MESSAGE NETWORKS

10. Please describe the networks (computer, if any, speed, code, line protocol, etc.)

11. How many terminals by type are on this network?

<u>TOTAL TERMINALS</u>	<u>TYPE/NO.</u>	<u>TYPE/NO.</u>	<u>TYPE/NO.</u>
_____	_____	_____	_____

12. What is the daily traffic on this network?

<u>AVG. # CHARS. PER MESSAGE</u>	<u>AVG # MSGS. PER DAY</u>	<u>PEAK MSGS. PER DAY</u>	<u>% INTRA. COMPANY</u>	<u>% MULTIPLE ADDRESS</u>
_____	_____	_____	_____	_____

13a. What is the average monthly traffic expense of this network?

13b. Are the costs allocated to the individual users?

13c. What methods are used to allocate the charges?

14. How has the system grown over the last five years and how do you expect it to grow during the next five years?

<u>PERIOD</u>	PERCENT OF GROWTH			
	<u>NUMBER OF TERMINALS</u>	<u>NUMBER OF MESSAGES</u>	<u>COST</u>	<u>INTRA/INTER</u>
Last five years	_____	_____	_____	_____
Next five years	_____	_____	_____	_____

15a. What are the primary applications on this network today?

1. _____
2. _____
3. _____

15b. What applications will you be adding or deleting during the next five years?

15c. Do/will any of these applications prepare information to be transmitted using other networks? (e.g., Telex, Mailgram, etc.)

16. Please fill in the following chart with respect to the listed network management oriented/value added network features.

CATALOG NO. **YIT2**

FEATURES	CURRENTLY USING	AVAILABLE BUT NOT USING (WHY)	WOULD LIKE TO HAVE	USEFUL WITH RESPECT TO COST	HAVE YOU DROPPED ANY FEATURES (WHY)
Message Delivery Status					
- Inquiry Based					
Message Delivery Status					
- Next Morning Report					
Message Retrieval - On-line					
Message Retrieval - Off-line					
Archival Message Storage					
Traffic Reports					
Station Status Reports					
Station Authorization Controls					
Operator Intercept					
Least Cost Routing					
Departmental Billing					

PART IV PRIMARY DATA COMMUNICATION NETWORK

17. Please describe this network (type of locations, computer center, speed, code, protocol, etc.)

18. How many terminals, including printers, by type are on this data network?

<u>TOTAL TERMINALS</u>	<u>TYPE/NO.</u>	<u>TYPE/NO.</u>	<u>TYPE/NO.</u>
----------------------------	-----------------	-----------------	-----------------

19a. What are the primary applications on the data network today?

1.

2.

3.

19b. What applications will you be adding or deleting during the next five years?

19c. Do/will any of these applications prepare information to be transmitted using other networks? (e.g., Telex, Mailgram, etc.)

19d. If so, which applications and which networks?

20. How has the system grown over the last five years and how do you expect it to grow during the next five years?

PART V FACSIMILE NETWORKS

21. Facsimile network description.

<u>EQUIPMENT</u>	<u>SPEED USED</u>	<u>NUMBER OF LOCATIONS</u>	<u>PAGES PER MESSAGE</u>	<u>MESSAGES PER DAY</u>	<u>COST PER MESSAGE</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

22. Please fill in the following chart with respect to your use or need for the features on your facsimile network.

FEATURES	CURRENTLY USING	AVAILABLE BUT NOT USING (WHY)	WOULD LIKE TO HAVE	(PAYING OR WILLING TO PAY)	USEFUL WITH RESPECT TO COST	HAVE YOU DROPPED ANY FEATURES (WHY)
Departmental Billing						
Fractionalized Billing						
T&C Call Billing						
Abbreviated Calling						
Automatic Retry						
Sequential Call Placement						
Group Codes						
Multiple Addressing						
Answerback Verification						
Automatic Service Upgrade						
Mailbox Delivery						
Station Polling						
Other						

PART VI INTRA-PREMISES NETWORKS

23a. Please describe your intra-premise network(s) at this or other company locations.
(Current state, Ethernet, etc., expected growth.)

23b. If you do not currently have an intra-premise network in this or another company location, please describe your implementation plans during the next five years.

24. Please list the following information concerning the intra-premise network.

<u>TERMINAL</u>	<u>NUMBER</u>	<u>DAILY TRAFFIC</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

25. What external services need to be interfaced to these intra-premise networks?

	<u>CURRENTLY</u>	<u>BY 1985</u>
Domestic TWX/TELEX	_____	_____
International Telex	_____	_____
Other Message Networks	_____	_____
Data Communications Networks	_____	_____
Facsimile Networks	_____	_____
Word Processing	_____	_____
Electronic Mail	_____	_____
Cablegram	_____	_____
Mailgram	_____	_____
Telegram	_____	_____
USPS (ECOM)	_____	_____
RCS	_____	_____
Applications	_____	_____
Data Entry	_____	_____
Programming	_____	_____
Data Base Access	_____	_____
Dataphone	_____	_____
Datetel	_____	_____
Packet Switching	_____	_____
Teletex	_____	_____

26. Please fill in the following chart for those message services you use or expect to use within the next five years.

<u>SERVICE</u>	<u>USE (U) PLAN TO USE (P)</u>	<u>APPLICATION</u>	<u>DAILY TRAFFIC</u>	<u>METHOD OF ACCESS</u>	<u>NUMBER OF ACCESS POINTS</u>
CABLEGRAM	_____	_____	_____	_____	_____
MAILGRAM	_____	_____	_____	_____	_____
TELEGRAM	_____	_____	_____	_____	_____
USPS (ECOM)	_____	_____	_____	_____	_____
OTHER _____	_____	_____	_____	_____	_____

27. Please fill in the following chart for those information services you use or plan to use within the next five years.

<u>SERVICE</u>	<u>USE (U) PLAN TO USE (P)</u>	<u>APPLICATION</u>	<u>DAILY TRAFFIC</u>	<u>METHOD OF ACCESS</u>	<u>NUMBER OF TERMINALS</u>
REMOTE COMPUTING SERVICES	_____	_____	_____	_____	_____
APPLICATIONS	_____	_____	_____	_____	_____
DATA ENTRY	_____	_____	_____	_____	_____
PROGRAMMING	_____	_____	_____	_____	_____
DATABASE	_____	_____	_____	_____	_____
OTHER	_____	_____	_____	_____	_____
OTHER	_____	_____	_____	_____	_____

28. Please fill in the following chart for those supplementary facilities services you use or plan to use within the next five years.

<u>FACILITY</u>	<u>PLAN TO USE (P)</u>	<u>USE (U)</u>	<u>APPLICATION</u>	<u>DAILY TRAFFIC</u>	<u>METHOD OF ACCESS</u>	<u>NUMBER OF ACCESS POINTS</u>
DATAPHONE	_____	_____	_____	_____	_____	_____
DATEL	_____	_____	_____	_____	_____	_____
PACKET SWITCHING	_____	_____	_____	_____	_____	_____
OTHER	_____	_____	_____	_____	_____	_____

PART VIII FUTURE SERVICES

29. What protocol conversions do you expect to require in the next five years?

30. In general how do you feel your company will grow with respect to communications during the next five years?

31. Do you anticipate the use of:

	<u>YES/NO</u>	<u>WHEN</u>
Videotex	_____	_____
Communication personal computer systems	_____	_____
Communicating word processors	_____	_____
X.25 devices	_____	_____

32. What major changes or services would you like to see in the near future with respect to communication services?

33a. Do you see a need for a message switch capability?

33b. Do you prefer your own private switch or a shared switch? Why?

33c. Which network would require the switch?



